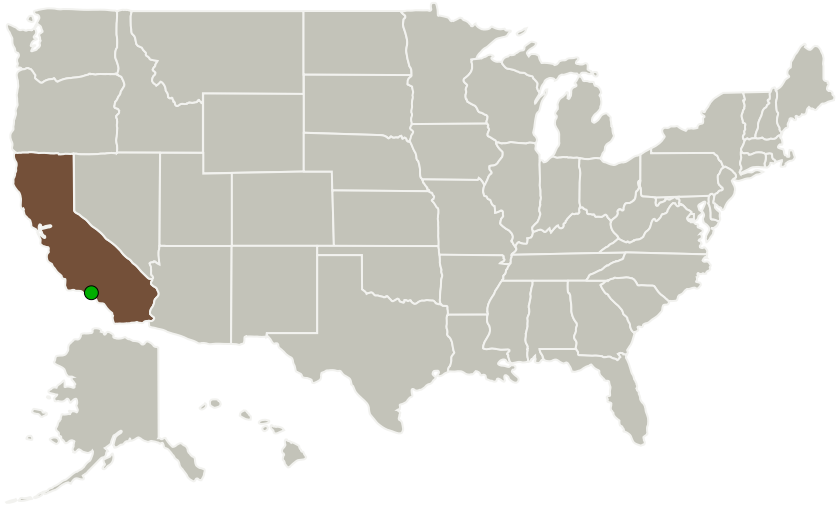
Weaved Distributed Plastic Optical Fiber Sensor (DIFOS) SHM system, Phase I

Completed Technology Project (2017 - 2017)

Project Introduction

In Phase I, Redondo Optics Inc. proposes to develop, demonstrate, and deliver to NASA an innovative, fully integrated, miniature size, light weight, ultra-low power, and wireless communication weaved distributed plastic optical fiber sensor (DIFOS) SHM system suitable for the global monitoring of passive and dynamic - axial and bi-axial - stresses and shape history within the canopy broadcloth fabric of large and entire cross-sections of NASA's disk-gap-band (DGB) parachutes planned for the Mars 2020 mission landings. ROI's DIFOS structural health monitor (SHM) sensor system is based on the innovative integration of proven state-of-the-art technologies: 1) use of minimally invasive (50-μm-fiber) plastic optical fiber (micro-bend, and/or FBGs) strain sensors cross-weaved within the parachute canopy broadcloth fabrics and strands of supersonic parachutes; 2) use of ROI's proprietary PIC microchip optical frequency domain reflectometry (OFDR) for the high spatial resolution (cm's) distributed monitoring of the axial and bi-axial strain/stress state of the weaved optical fibers over the entire canopy broadcloth fabric of the parachute structure. In Phase II, the DIFOS SHM system will be integrated into an airborne ready decelerator system and tested under load environments representative of decelerator decent missions.

Primary U.S. Work Locations and Key Partners



weaved distributed plastic optical fiber sensor (DIFOS) SHM system, Phase I Briefing Chart Image

Table of Contents

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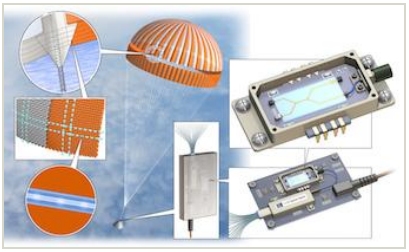
Organizations Performing Work	Role	Type	Location
Redondo Optics, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB)	Redondo Beach, California
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations
California

Images



Briefing Chart Image
weaved distributed plastic optical fiber sensor (DIFOS) SHM system, Phase I Briefing Chart Image *(https://techport.nasa.gov/image/133404)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Redondo Optics, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

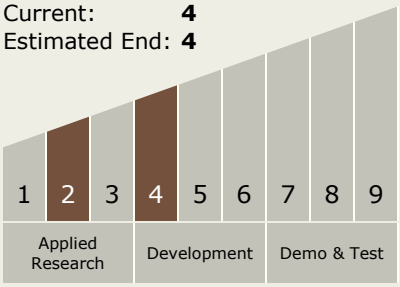
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Edgar A Mendoza

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX09 Entry, Descent, and Landing
  - TX09.2 Descent
    - TX09.2.1 Aerodynamic Decelerators